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September 19, 2014

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS), UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
LICENSEE EVENT REPORT (LER 2014-004-00)
CONDENSATE SYSTEM BYPASS VALVE FAILURE AND A PROCEDURE DEFICIENCY CAUSE LOSS OF FEEDWATER AND AUTOMATIC REACTOR TRIP

Attached is Licensee Event Report (LER) 2014-004-00, for the Virgil C. Summer Nuclear Station (VCSNS). This report describes the failure of the Condensate Demineralization System Condensate Bypass Valve to stroke open and the procedure deficiency that resulted in an automatic reactor trip. This report is submitted in accordance with 10CFR50.73(a)(2)(iv)(A).

Should you have any questions, please call Mr. Bruce Thompson at (803) 931-5042.

Very truly yours,

Thomas D. Gatlin

WLT/TDG/ts
Attachment

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File (818.07)
PRSF (RC-14-0153)

IE22
NRR

NRC FORM 366 (02-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

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4. TITLE

CONDENSATE SYSTEM BYPASS VALVE FAILURE AND A PROCEDURE DEFICIENCY CAUSE LOSS OF FEEDWATER AND AUTOMATIC REACTOR TRIP

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
7	22	2014	2014	004	00	9	19	2014		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☑ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
48%	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Bruce Thompson, Manager Nuclear Licensing	(803) 931-5042

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	SD	V	N/A	N	D	SD	V	N/A	N

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☑ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

1.0 ABSTRACT

On 7/22/2014 at 0414, VC Summer Nuclear Station automatically tripped due to low Steam Generator water level in "C" Steam Generator. The trip was the result of the Condensate Bypass Valve, XVB09210-WI, failing to open as required while removing the Condensate Demineralization (WI) System from service during plant startup. With flow removed from the WI system and bypass valve XVB09210-WI closed, condensate flow to the Deaerator Storage Tank (DAST) was isolated. All operating main Feedwater pumps tripped on DAST Low-Low level setpoint. The water level in the Steam Generators decreased and resulted in a reactor trip.

The cause of this event was failure of XVB09210-WI to stroke open due to a failed solenoid actuator and a procedure deficiency in manipulating the WI System. For corrective actions, the solenoid actuator for XVB09210-WI was replaced and the system operating procedure for the WI system has been revised to direct the operator to verify that XVB09210-WI is has actuated open before reducing the flow through the Condensate Polishing Demineralizers.

This report is submitted in accordance with 10CFR50.73(a)(2)(iv)(A).

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NARRATIVE

2.0 EVENT DESCRIPTION

On 7/22/2014 at 0414, while increasing in power following a planned maintenance outage, VC Summer Unit 1 automatically tripped due to low water level in "C" Steam Generator. Reactor power was 48% at the time of the turbine trip. The trip occurred when the Condensate Demineralization (WI) System Condensate Bypass Valve, XVB09210-WI, failed to open when taken to OPEN at the Filter/Demineralizer Control Panel (XPN0087). Due to procedural deficiencies, Operators at the local panel did not verify that valve XVB09210-WI actuated open. When the Condensate Polishing Demineralizer flow control valves were closed in later procedure steps, condensate flow through the polishing skid was isolated resulting in a loss of Condensate (CO) flow to the Deaerator. The loss of CO flow caused the Deaerator Storage Tank (DAST) to reach the low-low level setpoint, which tripped all Main Feedwater Pumps. The loss of Feedwater led to an automatic reactor trip on Lo-Lo Steam Generator level in "C" Steam Generator.

3.0 EVENT ANALYSIS

The CO System and the Feedwater System form the portion of the secondary plant cycle that returns water to the Steam Generators. The CO System collects condensed steam in the main and auxiliary condensers and pumps this condensate to the DAST where it becomes Feedwater in the Feedwater System.

The WI System is operated at low power levels during plant startup to clean up the CO System. CO polishing is provided by aligning the Condensate Pumps to the WI System, forcing flow through the powdered resin type Condensate Polishing Demineralizers at up to 50% of maximum condensate flow. Each demineralizer vessel can process 25% of full condensate flow. Three Condensate Polishing Demineralizers (two in service with one in regen or standby) are filled with ion exchange resin which produces pure water by removing chemical impurities and any particles suspended in the condensate water.

XVB09210-WI, Condensate Bypass Valve, is a non-safety 18 inch Jamesbury air operated butterfly valve that failed to open during power ascension due to a failed solenoid valve assembly. The solenoid operated valve (SOV) failed due to an aged elastomeric component. The type of solenoid operated valve (SOV) that failed is only associated with the WI System.

While performing the system operating procedure to remove the WI System from service, the operator at the Filter/Demineralizer Control Panel did not verify that there was a flow path through XVB09210-WI prior to isolating the flow through the Condensate Polishing Demineralizers. This resulted in the loss of all condensate flow.

The station's Reactor Protection System performed as designed and within their functional limits. All Emergency Feedwater pumps automatically started on Lo-Lo Steam Generator level and all control rods inserted fully.

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NARRATIVE

4.0 SAFETY SIGNIFICANCE

A PRA sensitivity analysis was performed on the addition of a reactor trip. The initiating event frequency (IEF) is based on plant data, with the reactor trip value currently calculated as five events in 10.8 years, or 0.463/year. Therefore the new IEF, with the additional reactor trip, can be estimated as six events in 10.8 years, or 0.556/year.

The current core damage frequency (CDF) is 4.2239E-06 and the post event CDF is estimated at 4.2929E-06 (with one additional reactor trip).

The resultant change in core damage frequency (ΔCDF) is 6.9E-08, which is below the risk significance threshold. This delta equates to an increase of approximately 1.63% in CDF.

5.0 PREVIOUS OCCURRENCE

There have been no previous occurrences of loss of condensate flow resulting in a reactor trip in the last three years.

6.0 CORRECTIVE ACTIONS

The solenoid actuator for XVB09210-WI was replaced and the valve was returned to functional status. The system operating procedure for the WI system has been revised to direct the operator to verify that XVB09210-WI has actuated open before reducing the flow through the condensate polisher vessels.

Additional corrective actions being evaluated and tracked by the station's corrective action program are: Enhanced training on the WI system, additional operating procedure enhancements, and increased preventative maintenance.